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TITLE

AN INFESTATION OF COLORADIA? IN BLACK HILLS OF SOUTH DAKOTA AND WYOMING

By

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Forest Insect Laboratory,
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AN INFESTATION OF COLORADIA? IN BLACK HILLS OF SOUTH DAKOTA AND WYOMING

INTRODUCTION

An infestation of this unidentified insect in ponderosa pine near Osage, Wyoming, was reported by Mr. A. D. Stoesz, Regional Nurseryman, Soil Conservation Service, during June 1939. Supervisor E. A. Snow and Ranger Russell Smith of the Harney National Forest also observed the infestation during the latter part of June. During the summer several visits were made to the area by the writer for observation and collections.

Because the identity has not yet been cleared up no description of the stages is included in this report. This report is merely to get on record some of the observations on its habits. After all the stages have been clearly associated and the infestation watched another season, a more complete report can be prepared. After an examination of the infestation on July 5 to 8, 1939 an office memorandum[1/] was prepared and the insect erroneously called the pandora moth, Coloradia pandora Blake.

IDENTITY

Moths sent to the Fort Collins Forest Insect Laboratory during June were tentatively identified as Coloradia pandora Blake.

1/ Memorandum on pandora moth outbreak in Black Hills of South Dakota and Wyoming. N. D. Wygant. Office memorandum, July 10, 1939.

Mr. R. A. Phillips, E. A. Snow, and Russell Smith, who collected the moths, stated that the moths were very numerous early in June west of Newcastle, Wyoming. On June 21 the foliage was very heavily covered with eggs and they assumed that the eggs were laid by the moths.

When the writer visited the area in July after the eggs had hatched and the larvae were in the second and third instars, it was very evident that the larvae were decidedly different from Coloradia pandora. For comparison of the larvae of Coloradia? with C. pandora Figures 3 and 4 are included.

The moths collected by Snow and Smith and larvae collected by the writer were sent to Washington for determination on July 20. J. F. G. Clarke determined the moths as Coloradia sp. near pandora Blake. Carl Heinrich, who examined the larvae, made the following comment: "The larvae under Hopk. U. S. 31560-D are something quite different and by all the characters they present are not even of the genus Coloradia, although they belong in the Saturniidae. Suggest rearing if more can be secured to match. Do not think they have anything to do with the adults which were submitted under the same number."

The eggs which have been associated with the larvae are very similar in appearance to those of Coloradia pandora but they have

not yet been definitely associated with the moths. A number of pupae are now in rearing and not until the moths emerge will it be definitely known whether this report deals with one insect or two. Since the moths of Coloradia sp. near pandora were very numerous during June and no caterpillars other than those examined by Heinrich were present in July it seems probable that the two stages represent one species.

BIOLOGY

Adults. The adults of Coloradia sp. near pandora were said to be numerous late in May and early in June. The first visit to the area was on July 5 after the moths had disappeared and no records were obtainable on their habits.

Eggs. The eggs are ovoid in shape, slightly compressed, and very similar to those of C. pandora. The eggs were nearly always laid in clusters on a single needle, Fig. 1. The eggs of C. pandora are generally laid on the bark of the smaller branches.

Larvae. The eggs started hatching the latter part of June and by July 5 most of them had hatched and some of the larvae were in the second instar. The larvae are gregarious during the first instar and feed in groups starting at the tip of a needle. The fourth and fifth instars are illustrated in Figures 2 and 3 respectively.

Collections of larvae were made on July 5, July 19, and August 23, 1939. Measurements of head capsules from the collections, Table I, show that there are 5 instars. On July 5 most of the larvae were in the first instar and a few in the second. On July 19 most larvae were in the third instar and a few in the fourth. On August 23 most larvae were in the fifth instar and a few in the fourth. By the first of September most of the larvae had reached maturity and left the trees.

Table I

Head Measurements of Coloradia?

Instar	Number Larvae Measured	Average width of Head in .001 inch	Variation in width in .001 inch
1	30	44.4	40-47
2	30	65.2	60-71
3	30	89.6	82-95
4	30	131.6	115-140
5	30	196.1	176-218

Pupae. The mature larvae seek completely decomposed logs and stumps and pupate under or in the decomposed wood. Although the soil was a very loose shale and would be an ideal soil for Coloradia pandora, very few pupae of this related insect could be found in it.

NATURAL CONTROL FACTORS

Weather. The first and second instar larvae were very numerous on the foliage on July 5, and it appeared that at least 15,000 acres of ponderosa pine would be completely defoliated by the end of the summer. When the area was again visited on July 19 approximately 1 percent of the larvae remained. After consideration of all possible factors such as predators and parasites the great reduction seemed attributable only to the weather. On July 15 at 7:30 p.m. a 46 M.P.H. gale was registered by the U. S. Weather Bureau station at Newcastle, Wyoming. During this wind storm and following it 0.47 inch of precipitation was registered. Judging from testimony of residents of Upton, Wyoming, which is nearer the heaviest infestation, the storm was even more severe and precipitation greater at that point. A few dead larvae could be found on the ground on July 19 but they were not numerous. On the trees in small ravines protected from the wind the larvae were more numerous than in exposed places.

Maximum temperatures of 104.5° F. and 104° F. were registered at the Weather Bureau Station on July 10 and 11 respectively. It is doubtful that these temperatures caused the mortality.

Parasites. A tachinid parasite (Hopk. U. S. 31405-R) has been reared from the larvae but has not yet been identified. The tachinid larvae leave the caterpillars and make their cocoons in the soil.

A number of pupae of the moth were opened which were parasitized by a gregarious chalcid. As yet no adult chalcids have emerged in the rearing cage.

EXTENT OF INFESTATION AND DAMAGE

The heaviest infestation occurs northwest of Newcastle, Wyoming, with the heavy center between Osage, Wyoming, and 4 miles northwest of Upton, Wyoming, north of Highway U. S. 16, where rather severe defoliation occurred last year. On July 5-8 the larvae were very abundant over approximately 15,000 acres and thinly spread over a much larger area. At that time newly hatched larvae were common but not abundant along Highway U. S. 85 north of Newcastle. One egg cluster was found in Gillette Canyon approximately 7 miles inside the west boundary of the Harney National Forest. Several newly hatched groups were found in the hurricane area along Highway U. S. 16 which was about 6 miles inside the forest boundary.

The areas of heaviest infestation are on private land in more or less fringe type forest. Ips, drought, sawflies, and

this insect have caused extensive killing of many of the trees (Fig. 5.). In certain areas approximately 50 percent of the trees have died within the past 4 or 5 years.

SUMMARY

An infestation of Coloradia? was discovered in ponderosa pine northwest of Newcastle, Wyoming, during June 1939. Moths collected in the area have been identified as Coloradia sp. near pandora Blake and the larvae collected in the area but not yet definitely associated with the moths do not appear to be of the genus Coloradia. The identity of the stages cannot be cleared up until after moths emerge from the pupae now in rearing.

The moths, assuming that there is only one species involved, emerge in May and June and lay their eggs in clusters on the needles. The eggs hatch during late June and early July. During the first instar the larvae are gregarious but in later instars feed singly. There are 5 instars and the larvae reach maturity around the first of September and pupate beneath or in completely decomposed logs or stumps. The insect apparently completes its cycle in one year.

When the infestation was examined on July 5-8, 1939, the small larvae were very numerous and it appeared that at least 15,000 acres would be completely defoliated by the end of the summer. When the area was again visited on July 19 approximately

1 percent of the larvae remained. A 46 M.P.H. gale accompanied by 0.47 inch of precipitation, as registered by the Weather Bureau Station at Newcastle, Wyoming, apparently was responsible for the reduction. Two species of parasites have been taken, one from the mature larvae and one from the pupae, but they have not yet been identified.

The heaviest infestation occurs northwest of Newcastle, Wyoming, between Osage, Wyoming, and 4 miles northwest of Upton, Wyoming, north of Highway U. S. 16 where rather severe defoliation occurred during 1938. During 1939 very little defoliation occurred. The infestation was heaviest over approximately 15,000 acres and thinly spread over a much wider area. The main infestation occurs on private land in more or less fringe type ponderosa pine. Ips, drought, sawflies, and this insect have caused extensive killing of the trees.

Respectfully submitted,

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Approved:

Donald De Leon, Associate Entomologist

CC: Craighead (2)
Miller
Keen
Evenden

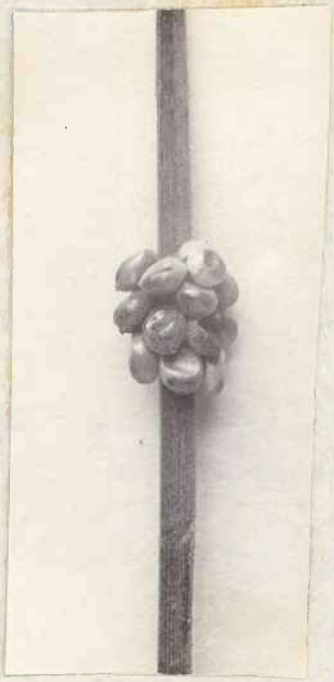

Fig. 1. Typical egg cluster of Coloradia? laid midway on needle. 2.5 x.

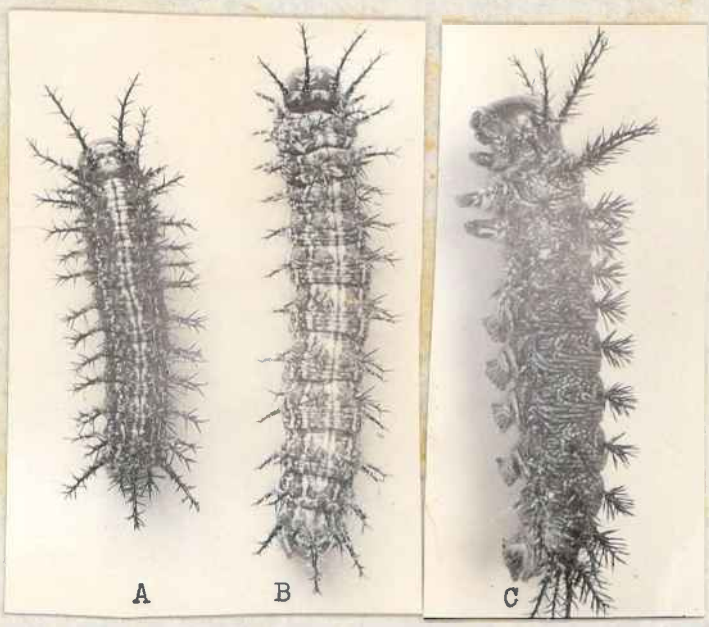

Fig. 2. Dorsal and lateral views of fourth instar larvae of Coloradia? 2.5 x.
A. A dark form in early fourth instar.
B. A light form in late fourth instar.
C. A dark form in late fourth instar.

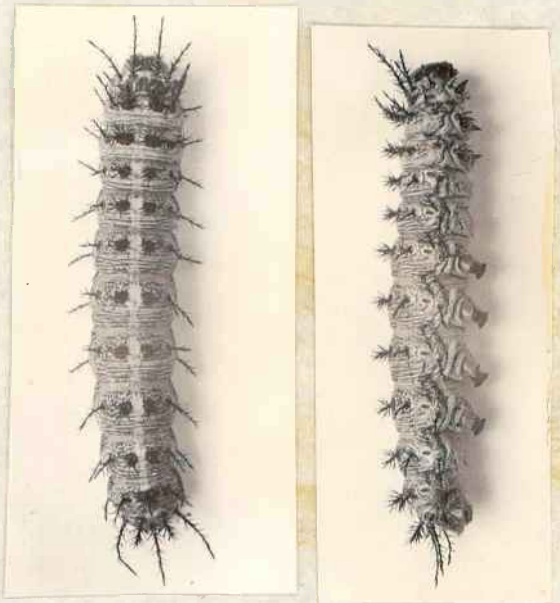

Fig. 3. Lateral and dorsal views of typical mature larvae of Coloradia? Natural size.

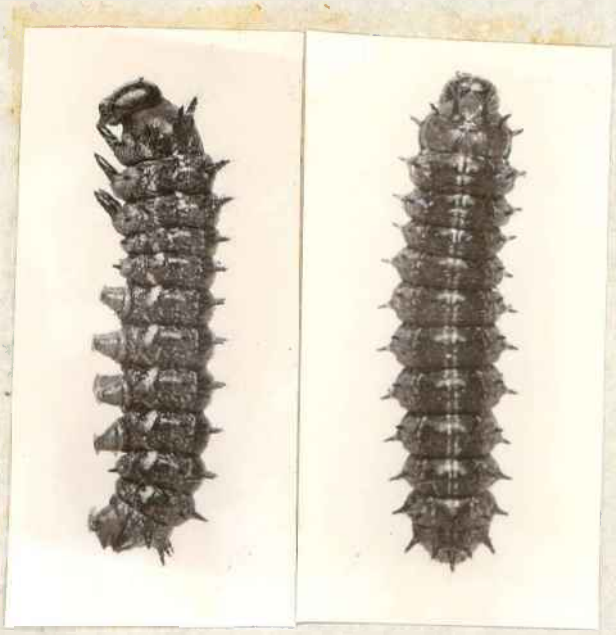

Fig. 4. Lateral and dorsal views of typical mature larvae of Coloradia pandora Blake from Hot Sulphur Springs, Colo. Natural size.

Fig. 5. Ponderosa pine defoliated by Coloradia? Upton, Wyo.